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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/700,439	11/13/2000	Rudolf Schwarte	752-00	5272

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2900 Two Thousand Market Street
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EXAMINER

KAO, CHIH CHENG G

ART UNIT	PAPER NUMBER
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2882

DATE MAILED: 10/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/700,439

Applicant(s)

SCHWARTE, RUDOLF

Examiner

Chih-Cheng Glen Kao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 6/5/03, 6/24/03, and 7/23/03.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 17 October 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claims 4-8 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only. See MPEP § 608.01(n). This objection may be obviated by replacing “one of claims 2 through 3 and 27” with - any one of claims 2, 3, and 27- in claims 4-8. For purposes of examination, the claim has been treated as such. Appropriate correction is required.
2. Claim 17 is objected to because of the following grammatical informalities: Claim 17 recites the limitation “array both PMD-pixels with 3D-functionality and also conventional CMOS-pixels with 2D-functionality” in lines 2-3. This objection may be obviated by inserting - has - after “array”. For purposes of examination, the claim has been treated as such. Appropriate correction is required.
3. Claim 21 is objected to because of the following grammatical informalities: Claim 21 recites the limitation "selectively for half of a 2-quadrant or 4-quadrant pixel, of the pixels" in lines 4-5. The comma appears to be in the wrong place. This objection may be obviated by moving the comma after “pixel” to the location after “pixels”. For purposes of examination, the claim has been treated as such. Appropriate correction is required.

Claim Rejections - 35 USC § 112 and 35 USC § 101

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 3, 19, 20, 22, 23, and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 3 recites the broad recitation "the electromagnetic waves", and the claim also recites "the remote infrared range" which is the

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narrower statement of the range/limitation. This rejection may be obviated by deleting “, in particular for the remote infrared range,”

6. Claim 19 provides for the use of an apparatus as set forth in claim 2, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

7. Claim 20 provides for the use of an apparatus as set forth in claim 2, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

8. Claim 22 provides for the use of an apparatus as set forth in claim 2, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

9. Claim 23 provides for the use of an apparatus as set forth in any one of claims 2 and 3, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

10. Claim 26 provides for the use of the apparatus in an optical PLL- or DLL-circuit, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

11. Claims 19, 20, 22, 23, and 26 are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi (US Patent 5955753) in view of Lambeth (US Patent 4826312) and Arques (US Patent 4985619).

Takahashi discloses an apparatus (Fig. 2) comprising at least two photosensitive modulation photogates (Fig. 2, #19 and hv) and non-photosensitive accumulation gates (Fig. 2, #21), and electrical connections for the photogates (Fig. 1, wires for PG) and accumulation gates

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(Fig. 1, wires for 21) so that the latter can be for reading-out, and the former can be connected to a modulating device increasing or reducing the potentials of the photogates relative to each other and relative to a potential of the accumulation gates (Fig. 3), characterized in that there are a plurality of photogates and accumulation gates formed group-wise as a PMD-pixel (Fig. 1 and 2).

However, Takahashi does not disclose strips for photogates nor reading-out diodes.

Lambeth teaches strips for photogates (Fig. 1). Arques teaches reading-out diodes (col. 2, lines 5-25).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the apparatus of Takahashi with the photogates of Lambeth, since one would be motivated to have a relatively large light sensitive area and a relatively low capacitance to better control the spill and fill process as shown by Lambeth (col. 2, lines 55-65).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the apparatus of Takahashi with the reading-out diodes of Arques, since one would be motivated incorporate them to reduce noise during charge transfers as shown by Arques (col. 1, lines 57-62).

13. Claims 1-9, 14, 16, 17, 19-23, and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwarte (WO 98/10255) in view of Lambeth.

14. Regarding claims 1, 2, 5-7, 14, 16, 17, 19-23, 26, and 27, Schwarte discloses an apparatus for detecting phase and amplitude of electromagnetic waves (Title) comprising: at least two

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photosensitive modulation photogates, paired and parallel (Fig. 6, " G_{am} " and " G_{bm} ") and arranged at substantially equal spacing (Fig. 7 and 13) in a push-pull relationship (Page 5, lines 20-27), non-photosensitive accumulation gates (Fig. 6, " G_a " and " G_b ") by shading (Fig. 7, #12), arranged between pairs of photogates (Fig. 7) in parallel strips (Fig. 8, " G_a " and " G_b ") and connected to a reading-out device (Fig. 13, #15), and a modulating device to increase or reduce potential of the modulation photogates (Fig. 12, #11, " $+U_m(t)$ ", and " $-U_m(t)$ ") wherein the accumulation gates are in the form of reading-out diodes (Fig. 13, #2 and " n^+ " connected to " G_a " and " G_b ") to form a PMD-pixel (Abstract, last sentence) in a linear or matrix array (Claim 22) with the width of the modulation gates greater than the accumulation gates (Fig. 13), a covering by a contact of high conductivity and very low transparency of electromagnetic waves (Fig. 13, electrode of " G_a " and " G_b " above the " n^+ " material), pixel elements (Fig. 2) which can have a plurality of pairs of modulation gates and accumulation gates (Fig. 14), wherein strip directions are perpendicular to each other (Fig. 14 and 2), and wherein PMD and CMOS pixels may be mixed for a depth image (Page 17, col. 6-10), a 3D and 2D functionality together with a data-fusioning and interpolating device for a depth image (Page 17, col. 12-17 and 26-30), wherein an image is illuminated by a modulation function with the photogates in push-pull, and half of the pixels are 90^0 phase-shifted in the case of sine modulation (Figs. 11 and 12).

However, Schwarte does not disclose strips for photogates.

Lambeth teaches strips for photogates (Fig. 1).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the apparatus of Schwarte with the photogates of Lambeth, since

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one would be motivated to have a relatively large light sensitive area and a relatively low capacitance to better control the spill and fill process as shown by Lambeth (col. 2, lines 55-65).

Also note that with regards to claim 14, the method of forming a device is not germane to the issue of patentability of the device itself. Therefore, this limitation has not been given patentable weight. See MPEP 2113.

With regards to claims 19, 20, 22, 23, and 26, the recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitation.

15. Regarding claim 3, Schwarte in view of Lambeth suggests an apparatus as recited above.

However, Schwarte does not seem to specifically disclose the width in the order of magnitude of a wavelength.

Lambeth further teaches photogates having a size and shape similar to the size and shape of the beam cross section (col. 2, lines 45-50), which in the case of Schwarte is a wavelength of the electromagnetic wave.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the suggested apparatus of Schwarte in view of Lambeth with the width in the order of magnitude of a wavelength, since one would be motivated to optimize the signal-to-noise ratio as shown by Lambeth (col. 2, lines 45-46).

Secondly, it would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the suggested apparatus of Schwarte in view of Lambeth with the width in the order of magnitude of a wavelength, since it has been held that where the general

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conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. One would be motivated to have the width of the photodetector in the order of magnitude of a wavelength in order to obtain a signal.

16. Regarding claims 4 and 25, Schwarte in view of Lambeth suggests an apparatus as recited above. Schwarte further discloses the length of the photogates and gates as more than 10 or 50 times the wavelength of radiation (Fig. 13).

However, Schwarte does not seem to specifically disclose a strip length of the photogates.

Lambeth further teaches a strip length of photogates (Fig. 1).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the suggested apparatus of Schwarte in view of Lambeth with the strip length of photogates, since one would be motivated to have this for a relatively large light sensitive area and a relatively low capacitance to better control the spill and fill process as shown by Lambeth (col. 2, lines 55-65).

Secondly, it would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the suggested apparatus of Schwarte in view of Lambeth with the length 10 times or 50 times the wavelength of the radiation, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. One would be motivated to have the length large enough to ensure that the photodetector detects the radiation as implied from Lambeth (col. 2, lines 55-65).

17. Regarding claims 8 and 9, Schwarte in view of Lambeth suggests an apparatus as recited above. Schwarte further discloses two reading-out lines from the accumulation gates to an evaluation circuit (Fig. 13, #15, G_a , and G_b).

However, Schwarte does not disclose the ends of pixels being defined by a photogate adjoining an accumulation gate.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the suggested apparatus of Schwarte in view of Lambeth with ends of pixels defined by a photogate adjoining an accumulation gate, since rearranging parts of an invention involves only routine skill in the art as shown by Schwarte (Figs. 8, 9, and 14). One would be motivated to have this arrangement to make the apparatus compact as implied from Schwarte (Figs. 8, 9, and 14).

18. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwarte in view of Lambeth as applied to claim 8 above, and further in view of Takahashi.

Schwarte in view of Lambeth suggests an apparatus as recited above. Schwarte further teaches modulation in 90° phase-shifted relationship (Page 29, lines 16-26) and pixels in a rectangle with strips diagonal, extending parallel (Fig. 2 and 14).

However, Schwarte does not specifically disclose the strips in directly mutually juxtaposed relationship so that mutually immediately adjacent photogates defining ends or sides of the two pixels form a pair of photogates and whereby either a single pixel element of double the size of a single pixel is formed with the two pixels, nor four pixels in a rectangle or square

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so that strips in diagonally opposite pixels are parallel while strips that are adjacent are perpendicular.

Takahashi teaches a single pixel element of double the size of a single pixel formed with two pixels (Fig. 2), which can be put in four pixels as a rectangle or square (Fig. 1).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to modify the suggested apparatus of Schwarte in view of Lambeth with double sizing of a pixel of Takahashi, since one would be motivated to use it to reduce the number of pixels (col. 2 lines 24-29) and have multi-functions for addition and non-addition (col. 2, lines 38-42) as implied from Takahashi.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to modify the suggested apparatus of Schwarte in view of Lambeth with the strips in directly mutually juxtaposed relationship so that mutually immediately adjacent photogates defining ends or sides of the two pixels form a pair of photogates, since rearranging parts of an invention involves only routine skill in the art as implied from Schwarte (Figs. 8, 9, and 14). One would be motivated to have this arrangement to make the apparatus more compact as implied from Schwarte (Figs. 8, 9, and 14).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the suggested apparatus of Schwarte in view of Lambeth and Takahashi with the strips in diagonally opposite pixels are parallel while strips that are adjacent are perpendicular, since rearranging parts of an invention involves only routine skill in the art as implied from Schwarte (Figs. 8, 9, and 14). If one employed the pixel of Schwarte (Fig. 14 or 8) into the array of pixels of Takahashi (Fig. 1) or Schwarte (Fig. 11, #8), one would have the

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configuration. One would be motivated to have this configuration to make the apparatus more compact.

Also note it would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have ends of pixels defined by a photogate adjoining an accumulation gate with the suggested apparatus of Schwarte in view of Lambeth, since rearranging parts of an invention involves only routine skill in the art as implied from Schwarte (Figs. 8, 9, and 14). One would be motivated to have this arrangement to make the apparatus more compact as implied from Schwarte (Figs. 8, 9, and 14).

19. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schwarte in view of Lambeth and Takahashi as applied to claim 12 above, and further in view of Wilder et al. (US Patent 5262871).

Schwarte in view of Lambeth and Takahashi suggests an apparatus as recited above.

However, Schwarte does not specifically disclose pixels combined individually, or doubly, or in quadruple relationship.

Wilder et al. teaches pixels combined in any varying number of relationships (Abstract, lines 1-8).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the suggested apparatus of Schwarte in view of Lambeth and Takahashi with the combination of pixels of Wilder et al. in a quadruple relationship, since one would be motivated to combine the pixels to provide high speed data capture as implied from Wilder et al. (Abstract).

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20. Claims 15, 18, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwarte in view of Lambeth as applied to claims 2 and 16 above, and further in view of Wilwerding (US Patent 4812640) and Matsumoto (US Patent 5420634).

Schwarte in view of Lambeth suggests an apparatus as recited above.

However, Schwarte does not disclose strip lenses or microlenses to focus substantially all light exclusively on photogates.

Matsumoto teaches microlenses focusing substantially all light exclusively on photogates (Fig. 3). Wilwerding teaches strip lenses (Fig. 1, #33).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the suggested apparatus of Schwarte in view of Lambeth with the microlenses of Matsumoto, since one would be motivated to ensure that the light or the entire image signal reaches the photogate as implied from Matsumoto (Fig. 3).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the suggested apparatus of Schwarte in view of Lambeth, and Matsumoto with strip lens of Wilwerding, since strips lenses and round lenses are equivalent structures known in the art, in that they are both lenses. One of ordinary skill in the art would have found it obvious to substitute strip lenses for round lenses. One would be motivated to use strip lens based on the shape of the elements that the lens directs light to as implied from Wilwerding (Fig. 1).

Response to Arguments

21. Objections to the specification, drawings, and claims made of record on 1/2/03 have been withdrawn in light of the amendments.

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22. Applicant's arguments with respect to claims 1-27 have been considered but are not considered persuasive.

With regards to the technology of a photonic mixing device, photonic mixing devices are known in the prior art in ordinary photodiodes (See Takahashi (US Patent 5955753)) as suggested in the rejection in paragraph 5 above, wherein light from different modulation photogates are mixed together (cover page of Takahashi). Although the photonic mixer device of Schwarte appears to operate according to a completely different algorithm than ordinary photodiodes, those limitations have not been specifically stated in the claim itself. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (703) 605-5298. The examiner can normally be reached on M - F (9 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (703) 308-4858. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



gk



DAVID V. BRUCE
PRIMARY EXAMINER